Alireza Habibzadeh

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Education

Sharif University of Technology — Tehran, Iran
B.Sc. in Computer Engineering, September 2020–July 2025
B.Sc. in Physics (double major), GPA: 18.54/20 (expected)

Young Scholars Club — Tehran, Iran
Preparation Course for the International Physics Olympiad 2019–2020

Allame Helli High school — Tehran, Iran
Diploma in Mathematics and Physics, GPA: 19.66/20 2017–2020

Experience

Swiss Federal Institute of Technology Lausanne (EPFL) — Lausanne, Switzerland
Research intern under the supervision of Prof. Tobias J. Kippenberg at Laboratory of Photonics and Quantum Measurements (LPQM). July 2023–October 2023

Worked on developing an automatic qubit calibration system and other projects. (See projects section for detail.)

Mobile Communication Company of Iran (MCI) — Tehran, Iran
After a series of training sessions and exciting visits to different facilities, we performed data analysis on a huge financial database of the largest mobile network operator in the Middle East. [Certificate] November 2022–June 2023

Teaching Experience

- **Numerical Computation** (TA) — Spring 2024
  Dr. Samira Hossein Ghorban, Sharif University of Technology
- **Intro Programming (Python)** (TA) — Spring 2024
  Dr. Turaj Armin, Sharif University of Technology
- **Linear Algebra** (TA) — Spring 2023
  Dr. Samira Hossein Ghorban, Sharif University of Technology
- **Engineering Probability and Statistics** (TA) — Fall 2022
  Prof. Ali Sharifi-Zarchi, Sharif University of Technology
- **Intro Programming (C)** (TA) — Fall 2022
  Prof. MohammadAmin Fazli, Sharif University of Technology
- **Physics Olympiad** (Teacher) — 2020–2022
  Allame Helli High school

Honors and Awards

- Selected as one of 41 students worldwide ($< 3\%$ acceptance rate) to participate in the **E3 (EPFL Excellence in Engineering)** internship program [Certificate] — 2023
- **Silver medalist** at 4^{th} European Physics Olympiad, Romania [Certificate] — 2020

- **Sir Isaac Newton Award** (Among the top 200 participants) [Certificate] 2020
  Sir Isaac Newton Exam (SIN) is a test of high school physics and is offered by the Department of Physics & Astronomy at the University of Waterloo.
- **Gold medalist** at 31st Iranian Physics Olympiad [Certificate] 2019

Projects

- **Telegram Group Social Dynamics** (Related course: Network Science) [Repository and Results] Fall 2023

  Under the supervision of Prof. Saman Moghimi-Araghi, we studied the communication network among members of the course within the Telegram group. We collected data on users and message interactions using Telegram's MTProto API and `telethon` *library. The gathered data was saved in a database for further analysis. We analyzed the degree distribution of individuals interacting, revealing power-law behavior akin to real social networks. The network was constructed based on interactions such as replies, emoji reactions, and pinned messages.*

- **LPQM Automatic Qubit Calibrator** Summer 2023

  We developed an automatic calibrator system for Quantum Machines® controllers (OPX+ and Octave). Similar to [Google's approach] we implemented eight "calibration nodes" *to employ spectroscopy techniques to measure and analyze reflection data (S_{11}) from the superconducting qubits. We have also implemented a database and API for communication among these nodes. Automating the calibration process, formerly done with Vector Network Analyzers, lets us streamline measurements. This allows researchers to analyze temporal shifts by continuously monitoring resonator frequencies, Qubit frequencies, T_1, and more.*

- **LPQM Switch Controller** [Repository] [Demo] (Not connected to the real fridge!) Summer 2023

  I developed a Python API and a web-based GUI for network switches connected to Radiall™ switches in the Bluefors fridge at LPQM lab, optimizing switching processes to minimize pulse length and reduce heat input during setup changes.

- **LPQM Autonomous Wafer Testing System** Summer 2023

  I configured an MPI TS2000-D probe station and a Keithley 4200A-SCS parameter analyzer for remote control. I found a hardware issue with the prober's GPIB module, so I replaced it with an external GPIB module and reconfigured the prober, enabling successful communication and automating the wafer test procedure.

- **Percolation Models in Disease Dynamics** (Related course: Complex Systems) [Repository] Spring 2023

  Under the supervision of Prof. Shahin Rouhani, we analyzed disease spread using percolation models, comparing outcomes with traditional SIR simulations on weighted graphs. Our project offers key insights into real-world epidemics, emphasizing the significance of percolation models for correctly understanding disease propagation.

- **Warp Plus** [Repository] Spring 2024–Current

  Cloudflare's network is one of the last remaining connections linking Iran's highly restricted internet to the global network. As numerous websites rely on Cloudflare's content delivery network, the country's firewall cannot blacklist their IP addresses. I have therefore set up a server in Iran and contributed to open-source tools that scan for less restricted endpoints to create a Warp tunnel. I have also developed tools to periodically monitor the tunnel's health and re-scan in case of blockage. I can route traffic disguised as a fake website's traffic with TLS encryption incoming to the server into that tunnel, connecting people to the free world.

- **Java Yu-Gi-Oh!** (Related course: Advanced Programming) [Repository] Spring 2021

  We made a graphical Java version of the iconic card game, demonstrating our skills in Java programming and game design.

Notable Courses

- **Machine Learning** (20.0/20) (top undergrad student)
  Prof. Mahdi Jafari Siavoshani
- **Computer Simulation** (20.0/20)
  Prof. Bardia Safaei
- **Numerical Computation** (20.0/20)
  Dr. Fatemeh Baharifard
- **Advanced Programming** (20.0/20)
  Prof. MohammadAmin Fazli
- **Biophysics** (20.0/20)
  Prof. Nader Reihani
- **Network Science** (20.0/20)
  Prof. Saman Moghimi Araghi
- **Complex Systems** (19.5/20)
  Prof. Shahin Rouhani

Workshops & Certifications

- **Integrated Photonics for Next Generation Technologies (INGEN2023)** July 2023
  Saanen, Switzerland
- **Unlocking the Brain Will Shape Tomorrow's World** March 2023
  A workshop by Prof. Alireza Valizadeh on advancements in neuroscience and their implications for the future.
  Tehran, Iran
- **Introduction to Quantum Technologies** [Certificate] March 2023
  Psiket School of Science and Technology, Tehran, Iran
- **Qubit by Qubit** [Certificate] September 2022–April 2023
  IBM Quantum
- **Key Concepts in Blockchain Technology** [Certificate] Fall 2022
  IEEE Iran section
- **Hands on Particle Physics** [Certificate] March 2018
  The International Particle Physics Outreach Group (IPPOG)

Computer Skills

- **Tools and Frameworks:** `networkx`, `scikit-learn`, `pandas`, `scipy`, `numpy`, Docker, Git, Linux, LaTeX
- **Programming Languages:** Python, R, MATLAB, C/C++, SQL, Java, Go, Julia
- **Networking:** TCP/IP, DNS, firewalls, VPNs, routing & switching, Wireshark, serverless infrastructure

Languages

- **Persian:** Native
- **English:** Fluent
  [Iran Language Institute certificate]
  (TOEFL exam scheduled for November 2024)

References

Prof. Tobias J. Kippenberg
Full Professor, Laboratory of Photonics and Quantum Measurements (LPQM), EPFL
Email: tobias.kippenberg@epfl.ch

Dr. Marco Scigliuzzo
Postdoc Researcher, EPFL
Email: marco.scigliuzzo@epfl.ch

Dr. Samira Hossein Ghorban
Postdoc Researcher
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